



Critical and Creative Thinking in the Higher-Education Classroom



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Eric Mazur: "Why you can pass tests and still fail in the real world"



Today, assessment “focuses on the regurgitation of memorized information... instead of developing 21st-century skills, all we’re really doing is using assessment to rank and classify students.”

https://www.youtube.com/watch?v=P3X0I9W_c34

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Carol Dweck: “Growth vs Fixed Mindset”



“Students (especially beginning ones) are attentive (sometimes anxious, even frustrated) when there’s the possibility of more than one answer to a question. *Which one is correct? Which one will get me credit on the exam?*”

<http://www.facultyfocus.com/articles/teaching-professor-blog/relationship-participationdiscussion/?ET=facultyfocus:e137:253698a:&st=email#sthash.drwG2JH7.dpuf>

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Ken Robinson: “How schools kill creativity”



“By the time [kids] become adults...they’re afraid of making mistakes. We stigmatize mistakes. We are now running a national education system in which mistakes are the worst things you can make....The result is that we are educating people out of their creative capacity.”

http://www.ted.com/talks/ken_robinson_says_schools_kill_creativity?language=en

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What is critical thinking?



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Universal Structures of Thought

- Whenever we think
- we think for a purpose
- within a point of view
- based on assumptions
- leading to implications and consequences.
- We use data, facts and experiences
- to make inferences and judgments
- based on concepts and theories
- to answer a question or solve a problem.

We do these things unconsciously

Universal Structures of Thought

- What is my fundamental purpose?
- What is my point of view with respect to the issue?
- What assumptions am I using in my reasoning?
- What are the implications of my reasoning (if I am correct)?
- What information do I need in order to answer my question?
- What are my most fundamental inferences or conclusions?
- What is the most basic concept in the question?
- What is the key question I am trying to answer?


We need to do these things more deliberately

The Critical Thinking Foundation: www.criticalthinking.org


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Bloom's Taxonomy



This is where real critical thinking occurs


http://ww2.odu.edu/educ/roverbau/Bloom/blooms_taxonomy.htm

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How do we go about teaching students to improve their thinking?

- Build critical thinking into course objectives and student-learning outcomes
- Design activities and assessments that focus on the new objectives and outcomes
- Change our instructional style to match our assessment style



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How can we redesign our student-learning outcomes to encourage critical thinking?



What might these student-learning outcomes look like?

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Critical Thinking Learning Outcomes

- **Describe** patterns or relationships in large amounts of written and/or visual information.
- **Evaluate** information, evidence and argument for reliability and authority/usefulness (e.g., observation, testimony, measurement, experiment).
- **Identify and manage** the risks associated with making and implementing decisions.

<http://teachingtomtom.com/2012/11/15/writing-critical-thinking-learning-outcomes/>

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Critical Thinking Learning Outcomes

- **Analyze and assess** the strength of an argument and the implications for a course of action that follows from it.
- **Access or generate** alternatives and select the most appropriate.
- **Develop** a clearly articulated argument to support a view and use it to justify one or more conclusions.

<http://teachingtomtom.com/2012/11/15/writing-critical-thinking-learning-outcomes/>

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Critical Thinking Learning Outcomes

- **Analyze** a conflict and draw relationships with historical examples.
- **Generate** critical questions about historical examples.
- **Reflect on** the strength and weaknesses of yourself and your team members and suggest ways in which you and others could improve the work of the team in the future.

<http://teachingtomtom.com/2012/11/15/writing-critical-thinking-learning-outcomes/>

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Critical Thinking Learning Outcomes

- **Select and discuss** information to produce different ways of viewing a problem.
- **Determine** the component parts of a problem/issue, their relationships to each other and to the issue/problem as a whole.
- **Develop** a rationale for performing a character in a particular way.

<http://teachingtomtom.com/2012/11/15/writing-critical-thinking-learning-outcomes/>

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What kinds of activities and assessments best teach critical thinking?

How can they be achieved using the Universal Design for Learning Immersion Experience?



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Types of Assignments and Assessments

- Essays
- Group exams
- Oral exams
- Debates
- Graded discussions
- Academic poster sessions
- Self-reflections (perhaps responding to specific prompts)
- Group or individual projects
- Presentations to the greater community

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A Sample Assignment to do in class

- Students, in groups of four, choose the best paper, then join with a second group and choose the best of the two.
- This last paper is read to the class as a whole and a class-wide discussion is held about the strengths and weakness of the papers chosen, leading to the class voting on the best paper of the day

http://www.griffith.edu.au/_data/assets/pdf_file/0004/290659/Critical-evaluation-skills.pdf

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Try using SEEI to replace the multiple choice test

- **S**tate the concept (in a single sentence)
- **E**laborate on it (“In other words,...”)
- **E**xemplify it (“For example,...”)
- **I**llustrate it (provide a metaphor, analogy, or whatever might do the same work as a picture in a book: “It’s like...”)

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Take Advantage of Rubrics

- remove some of the ambiguity and subjectivity associated with open-ended questions
- force us to articulate what we’re looking for as we assess student work
- make the task of grading higher-order thinking exercises more manageable

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Rubrics can simply be checklists

Purpose: Does the student demonstrate a clear understanding of the assignment's purpose?	
Key Question, Problem, or Issue: Does the student clearly define the issue or problem, accurately identify the core issues, appreciate their depth and breadth?	
Point of View: Does the student identify and evaluate relevant significant points of view? Does the student demonstrate fairmindedness toward the problem?	
Information: Does the student gather sufficient, credible, relevant information (statements, logic, data, facts, questions, graphs, assertions, observations, etc.)? Does the student include information that opposes as well as supports the argued position? Does the student distinguish between information and inferences drawn from that information?	
Concepts: Does the student identify and accurately explain/use the relevant key concepts?	

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Try integrating instructional design into your teaching

- Move away from focusing solely on conveying material
- Establish deliberate connections between student-learning outcomes, assignments, and assessments
- Infuse your course with opportunities for critical thinking

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Web Resources on Critical Thinking

- <http://www.criticalthinking.org> - The Critical Thinking Community
- http://www.griffith.edu.au/_data/assets/pdf_file/0004/290659/Critical-evaluation-skills.pdf - Griffith Graduate Attributes Critical Evaluation Skills Toolkit
- <http://www.aacu.org/value/rubrics/critical-thinking> - Rubrics for critical thinking assessments
- <http://course1.winona.edu/shatfield/air/rubrics.htm> - A comprehensive list of rubrics for article reviews, case studies, class participation, critical thinking, essays, lab reports, presentations, and much more
- <http://www.pdx.edu/institutional-assessment-council/rubric-examples> - Portland State University rubric samples
- <http://ctfe.gmu.edu/wp-content/uploads/2012/08/12-CT-rubric-landscape-8-10.docx> - George Mason University Critical Thinking Rubric
- <http://www.foothill.edu/schedule/docs/CTRubric.pdf> - Foothill College Critical Thinking Rubric
- <http://business.fullerton.edu/centers/CollegeAssessmentCenter/RubricDirectory/CritThinking/CriticalThinkingRubric9.pdf> - Northeastern Illinois University Critical Thinking Rubric
- <http://www.pdx.edu/institutional-assessment-council/sites/www.pdx.edu/institutional-assessment-council/files/rubricCriticalThinking.pdf> - AACU Critical Thinking Rubric
- [https://www.gallaudet.edu/office_of_academic_quality/assessment_of_student_learning_outcomes/instructions_and_examples/developing_a_scoring_criteria_\(rubrics\).html#checklists.xml](https://www.gallaudet.edu/office_of_academic_quality/assessment_of_student_learning_outcomes/instructions_and_examples/developing_a_scoring_criteria_(rubrics).html#checklists.xml) - Gallaudet University's "Assessment of students learning rubric instructions"
- <http://rubistar.4teachers.org/index.php> - Rubric-making software
- http://stephenbrookfield.com/Dr._Stephen_D._Brookfield/Workshop_Materials.html - This whole site offers great tools for critical thinking
- <file:///C:/Users/law02008/Documents/ITL/Critical%20Thinking/Wolcott%20handbook%20on%20Critical%20Thinking.pdf> - Wolcott College Faculty Handbook: Steps for Better Thinking

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Critical Thinking Grid

	4 - Exemplary If applicable, consistently does all or almost all of the following	3 - Satisfactory If applicable, consistently does most or many of the following	2- Below Satisfactory If applicable, consistently does most or many of the following	1 - Unsatisfactory If applicable, consistently does all or almost all of the following
Purpose	--Demonstrates a clear understanding of the assignment's purpose	--Demonstrates an understanding of the assignment's purpose	--Is not completely clear about the purpose of the assignment	--Does not clearly understand the purpose of the assignment
Key Question, Problem, or Issue	--Clearly defines the issue or problem; accurately identifies the core issues --Appreciates depth and breadth of problem --Demonstrates fair-mindedness toward problem	--Defines the issue; identifies the core issues, but may not fully explore their depth and breadth --Demonstrates fair-mindedness	--Defines the issue, but poorly (superficially, narrowly); may overlook some core issues --Has trouble maintaining a fair-minded approach toward the problem	--Fails to clearly define the issue or problem; does not recognize the core issues --Fails to maintain a fair-minded approach toward the problem
Point of View	--Identifies and evaluates relevant significant points of view --Is empathetic, fair in examining all relevant points of view	--Identifies and evaluates relevant points of view --Is fair in examining those views	--May identify other points of view but struggles with maintaining fairmindedness; may focus on irrelevant or insignificant points of view	--Ignores or superficially evaluates alternate points of view --Cannot separate own vested interests and feelings when evaluating other points of view
Information	--Gathers sufficient, credible, relevant information: observations, statements, logic, data, facts, questions, graphs, themes, assertions, descriptions, etc. --Includes information that opposes as well as supports the argued position --Distinguishes between information and inferences drawn from that information	--Gathers sufficient, credible, and relevant information --Includes some information from opposing views --Distinguishes between information and inferences drawn from it	--Gathers some credible information, but not enough; some information may be irrelevant --Omits significant information, including some strong counter-arguments --Sometimes confuses information and the inferences drawn from it	--Relies on insufficient, irrelevant, or unreliable information --Fails to identify or hastily dismisses strong, relevant counter-arguments --Confuses information and inferences drawn from that information
Concepts	--Identifies and accurately explains/uses the relevant key concepts	--Identifies and accurately explains and uses the key concepts, but not with the depth and precision of a "4"	--Identifies some (not all) key concepts, but use of concepts is superficial and inaccurate at times	--Misunderstands key concepts or ignores relevant key concepts altogether
Assumptions	--Accurately identifies assumptions (things taken for granted) --Makes assumptions that are consistent, reasonable, valid	--Identifies assumptions --Makes valid assumptions	--Fails to identify assumptions, or fails to explain them, or the assumptions identified are irrelevant, not clearly stated, and/or invalid	--Fails to identify assumptions --Makes invalid assumptions
Interpretations, Inferences	--Follows where evidence and reason lead in order to obtain defensible, thoughtful, logical conclusions or solutions --Makes deep rather than superficial inferences --Makes inferences that are consistent with one another	--Follows where evidence and reason lead to obtain justifiable, logical conclusions --Makes valid inferences, but not with the same depth and as a "4"	--Does follow some evidence to conclusions, but inferences are more often than not unclear, illogical, inconsistent, and/or superficial	--Uses superficial, simplistic, or irrelevant reasons and unjustifiable claims --Makes illogical, inconsistent inferences --Exhibits closed-mindedness or hostility to reason; regardless of the evidence, maintains or defends views based on self-interest
Implications, Consequences	--Identifies the most significant implications and consequences of the reasoning (whether positive and/or negative) --Distinguishes probable from improbable implications	--Identifies significant implications and consequences and distinguishes probable from improbable implications, but not with the same insight and precision as a "4"	--Has trouble identifying significant implications and consequences; identifies improbable implications	--Ignores significant implications and consequences of reasoning

4 = Thinking is exemplary, skilled, marked by excellence in clarity, accuracy, precision, relevance, depth, breadth, logicity, and fairness

3 = Thinking is competent, effective, accurate and clear, but lacks the exemplary depth, precision, and insight of a 4

2 = Thinking is inconsistent, ineffective; shows a lack of consistent competence: is often unclear, imprecise, inaccurate, and superficial

1 = Thinking is unskilled and insufficient, marked by imprecision, lack of clarity, superficiality, illogicality, and inaccuracy, and unfairness

Critical Thinking Worksheet

Overall Score _____

If applicable, score the element (1-4)	Element of Reasoning	Comments
	Purpose: Does the student demonstrate a clear understanding of the assignment's purpose?	
	Key Question, Problem, or Issue: Does the student clearly define the issue or problem, accurately identify the core issues, appreciate their depth and breadth?	
	Point of View: Does the student identify and evaluate relevant significant points of view? Does the student demonstrate fairmindedness toward the problem?	
	Information: Does the student gather sufficient, credible, relevant information (statements, logic, data, facts, questions, graphs, assertions, observations, etc.)? Does the student include information that opposes as well as supports the argued position? Does the student distinguish between information and inferences drawn from that information?	
	Concepts: Does the student identify and accurately explain/use the relevant key concepts?	
	Assumptions: Does the student accurately identify assumptions (things taken for granted)? Does the student make assumptions that are consistent, reasonable, valid?	
	Interpretations, Inferences: Does the student follow where evidence and reason lead in order to obtain defensible, thoughtful, logical conclusions or solutions? Does the student make deep (rather than superficial) inferences? Are the inferences consistent?	
	Implications, Consequences: Does the student identify the most significant implications and consequences? Does the student distinguish probable from improbable implications?	

4 = Thinking is exemplary, skilled, marked by excellence in clarity, accuracy, precision, relevance, depth, breadth, logicity, and fairness

3 = Thinking is competent, effective, accurate and clear, but lacks the exemplary depth, precision, and insight of a 4

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<http://www.aacu.org/value/rubrics/critical-thinking> - Rubrics for critical thinking assessments

<http://course1.winona.edu/shatfield/air/rubrics.htm> - A comprehensive list of rubrics for article reviews, case studies, class participation, critical thinking, essays, lab reports, presentations, and much more

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<http://business.fullerton.edu/centers/CollegeAssessmentCenter/RubricDirectory/CritThinking/CriticalThinkingRubric9.pdf> - Northeastern Illinois University Critical Thinking Rubric

<http://www.pdx.edu/institutional-assessment-council/sites/www.pdx.edu.institutional-assessment-council/files/rubricCriticalThinking.pdf> - AACU Critical Thinking Rubric

[https://www.gallaudet.edu/office_of_academic_quality/assessment_of_student_learning_outcomes/instructions_and_examples/developing_a_scoring_criteria_\(rubrics\).html#checklists.xml](https://www.gallaudet.edu/office_of_academic_quality/assessment_of_student_learning_outcomes/instructions_and_examples/developing_a_scoring_criteria_(rubrics).html#checklists.xml) - Gallaudet University's "Assessment of students learning rubric instructions"

<http://rubistar.4teachers.org/index.php> - Rubric-making software

[http://stephenbrookfield.com/Dr. Stephen D. Brookfield/Workshop Materials.html](http://stephenbrookfield.com/Dr._Stephen_D._Brookfield/Workshop_Materials.html) - This whole site offers great tools for critical thinking

<file:///C:/Users/law02008/Documents/ITL/Critical%20Thinking/Wolcott%20handbook%20on%20Critical%20Thinking.pdf> - Wolcott College Faculty Handbook: Steps for Better Thinking